Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTER NUMBER						CANDIDATE NUMBER				

2429340652

MATHEMATICS (US) **0444/43**

Paper 4 (Extended) **October/November 2023**

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, center number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary work clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in parentheses [ ].

This document has **20** pages. Any blank pages are indicated.

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Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Lateral surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

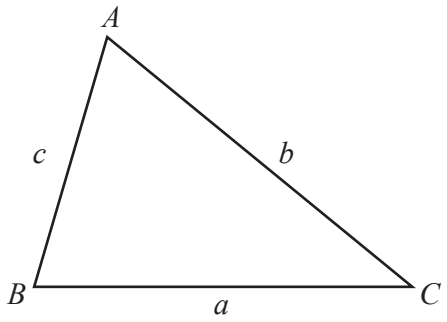
Lateral surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

Surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

1 The table shows the amount received when exchanging **$100** in some countries.

Country	Amount received for $100
Wales	77.05 pounds
India	7437.05 rupees
China	671.20 yuan
Spain	85.35 euros

(a) Brad changes $250 to Indian rupees.

Calculate the amount he receives correct to the nearest rupee.

..... rupees [2]

(b) Wang changes 5400 Chinese yuan into dollars.

Calculate how much he receives in dollars, correct to the nearest cent.

$ ..... [2]

(c) Gretal lives in Spain and goes on holiday to Wales.
She spends 3500 euros in total on travel and hotels in the ratio

travel : hotels = 4 : 3.

(i) Work out how much Gretal spends, in euros, on travel.

..... euros [2]

(ii) Work out how much she spends, **in pounds**, on hotels.

..... pounds [3]

2 The table shows the number of each type of bird seen in a garden on Monday.

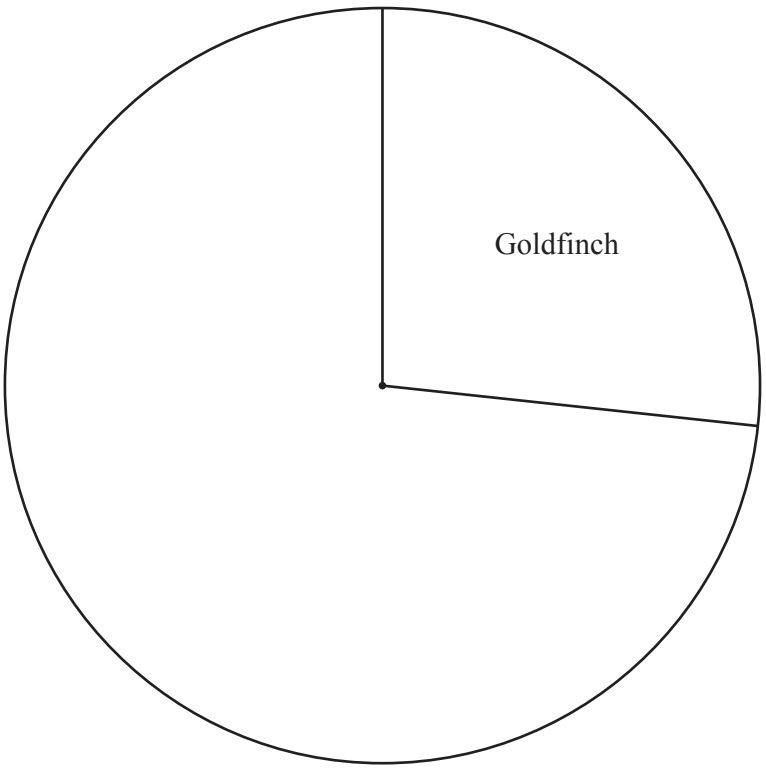
Type of bird	Frequency	Pie chart sector angle
Goldfinch	8	96°
Jay	6	
Starling	11	
Robin	5	

(a) Find the percentage of the birds that are Starlings.

..... % [2]

(b) **(i)** In the table, complete the column for the pie chart sector angle. [2]

(ii) Complete the pie chart to show the information in the table.



[2]

(c) On Tuesday, the number of Goldfinches seen in the garden increased by 262.5%.

Calculate the number of Goldfinches seen on Tuesday.

..... [2]

(d) One of the most common birds in the world is the Red-Billed Quelea which lives in Sub-Saharan Africa.
There are approximately 1500 million of these birds in this area.

(i) Write 1500 million in scientific notation.

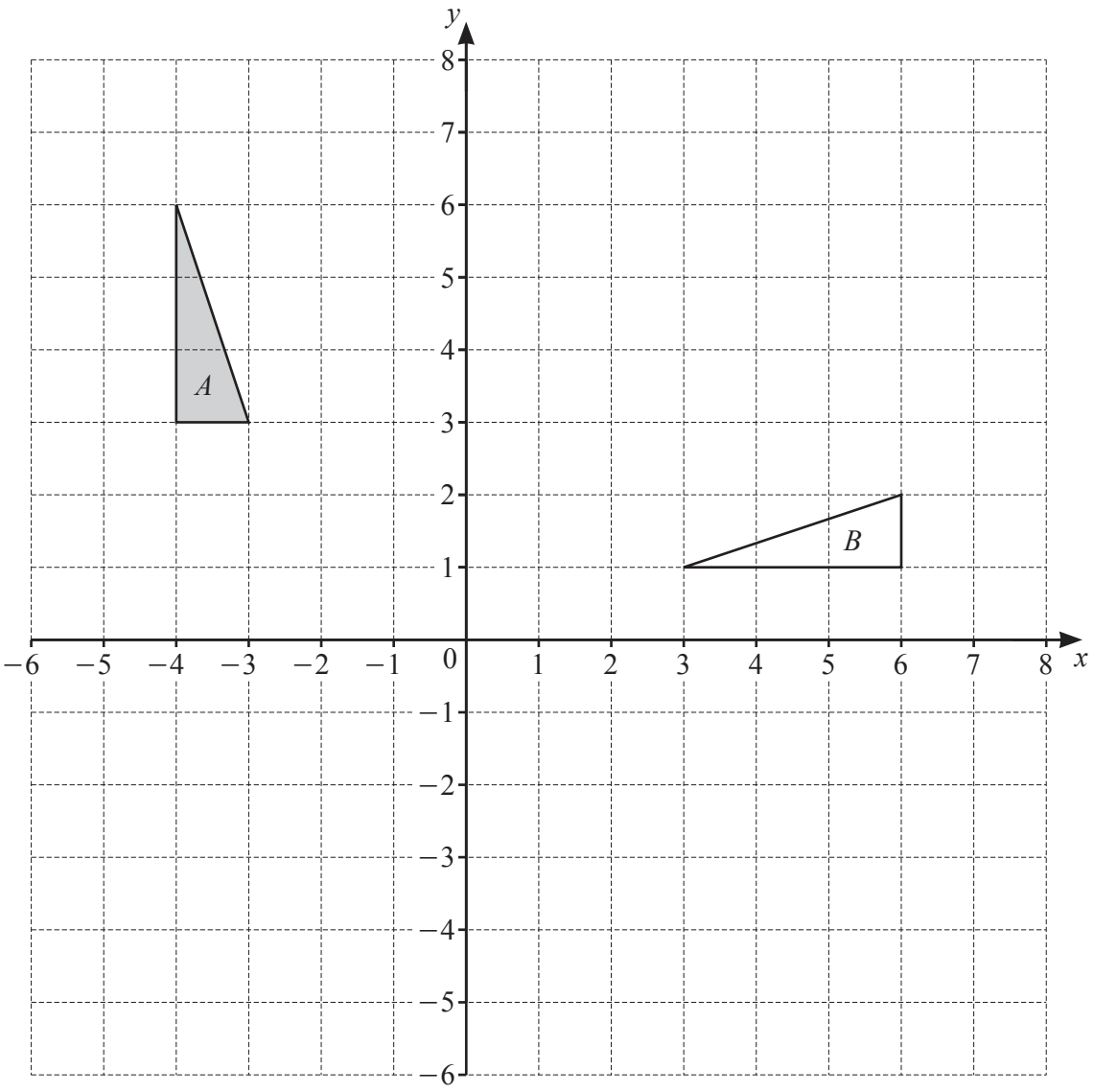
..... [1]

(ii) The land area of Sub-Saharan Africa is approximately 21.2 million square kilometers.

Work out the average number of these birds per square kilometer.

..... birds/km^2 [2]

3



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(b) Draw the image of triangle A after

(i) a reflection in the line $y = 1$ [2]

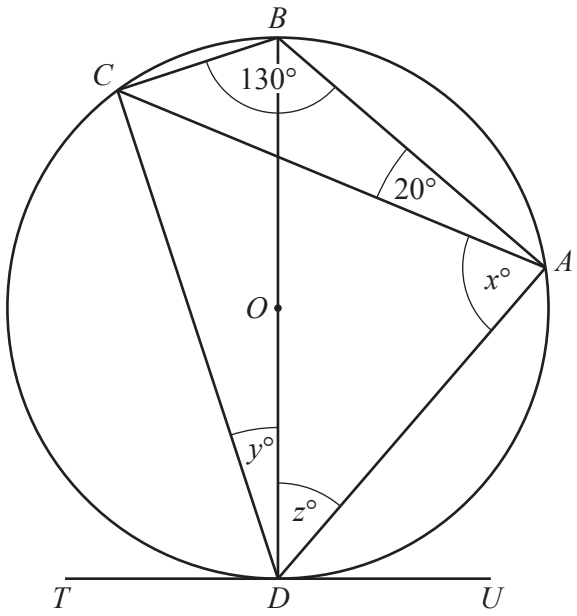
(ii) a translation by the vector $\begin{pmatrix} 5 \\ -7 \end{pmatrix}$ [2]

(iii) an enlargement, scale factor 2, center $(-4,\ 5)$. [2]

4 **(a)** Find the size of one interior angle of a regular 10-sided polygon.

..... [2]

(b)



NOT TO SCALE

A, B, C, and D are points on the circle, center O.
TU is a tangent to the circle at D.
BD is a diameter of the circle.

(i) Complete the statement.

Angle BDU = ... because .....

..... [2]

(ii) Find the value of each of x, y, and z.

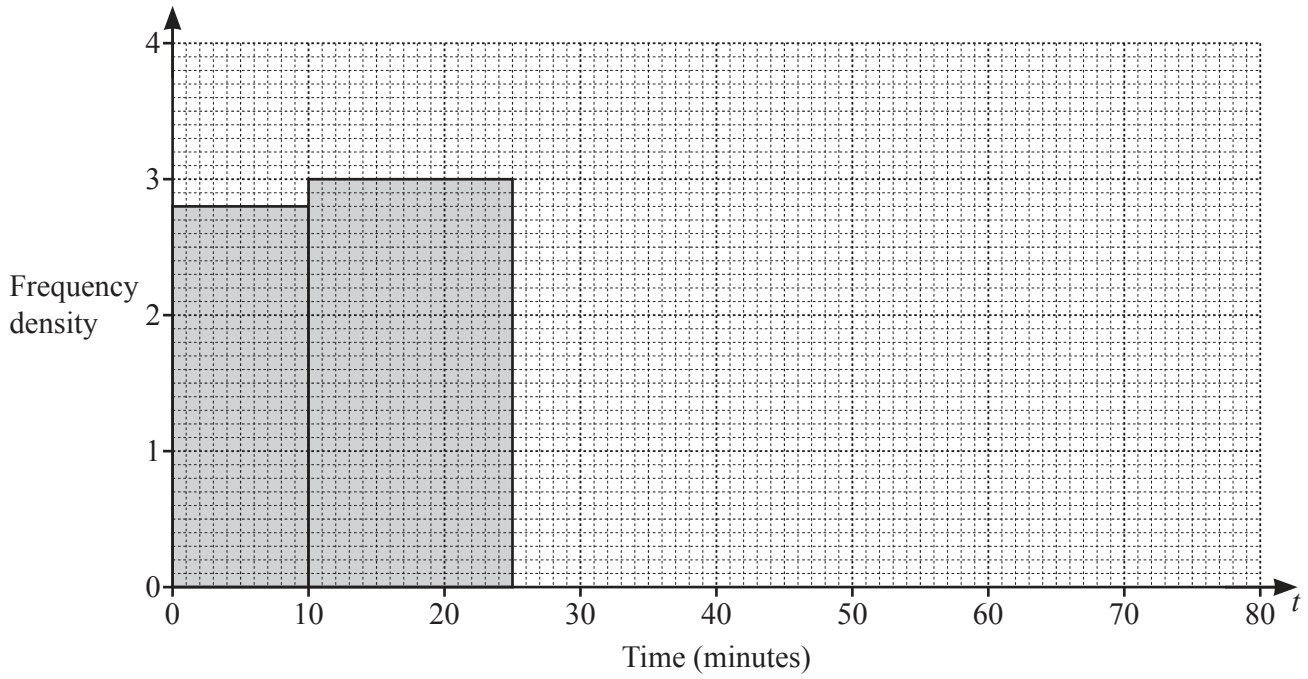
x = ...

y = ...

z = ... [3]

5 Indira records the time taken for workers in her company to travel to work.
The table and the histogram each show part of this information.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 25$	$25 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency			57	38	12



(a) Complete the table and the histogram.

[5]

(b) Calculate an estimate of the mean time.

..... min [4]

(c) Rashid says:

"The longest time that any of these workers take to travel to work is 80 minutes."

Give a reason why Rashid may be wrong.

.....

..... [1]

(d) Indira picks three workers at random from those who take longer than 25 minutes to travel to work.

Calculate the probability that one worker takes 60 minutes or less and the other two each take more than 60 minutes.

..... [4]

6 $f(x) = 5x - 3$ $g(x) = 64^x$ $h(x) = \frac{2}{x+1}, \quad x \neq -1$

(a) Find the value of

(i) $f(2)$

..... [1]

(ii) $g(f(0.5))$.

..... [2]

(b) Find $h^{-1}(x)$.

$h^{-1}(x) =$ ..... [3]

(c) Find x when $g(x) = \frac{1}{2^5}$.

$x =$ ..... [2]

(d) Write as a single fraction in its simplest form $\frac{1}{f(x)} - h(x)$.

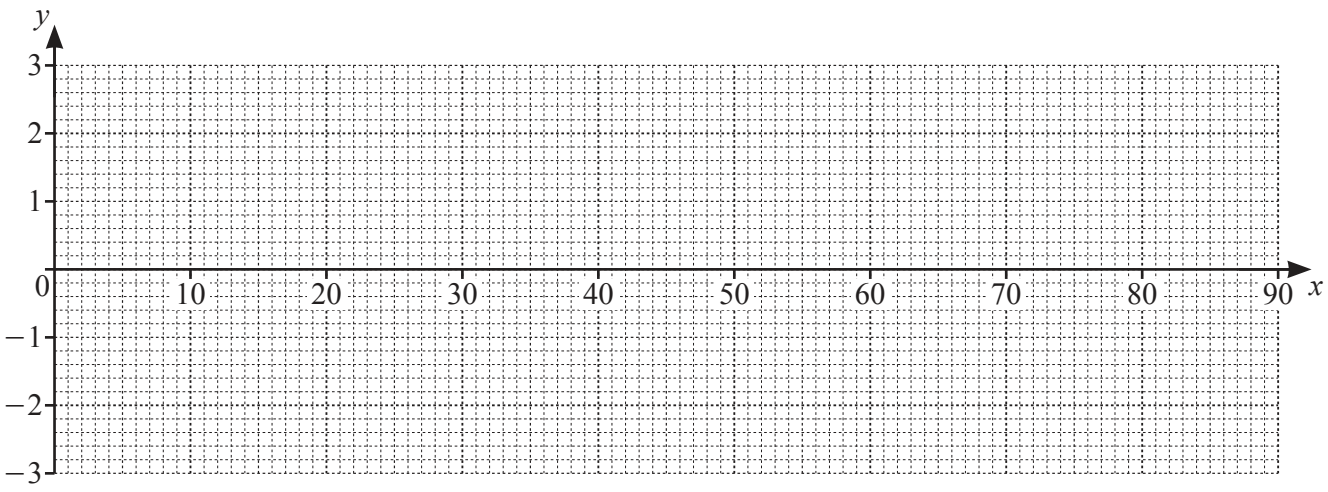
..... [4]

7 **(a)** Complete the table of values for $y = 3\cos 2x°$.
Values are given correct to 1 decimal place.

x	0	10	20	30	40	45	50	60	70	80	90
y	3.0	2.8	2.3	1.5	0.5		−0.5		−2.3		−3.0

[3]

(b) Draw the graph of $y = 3\cos 2x°$ for $0 \leqslant x \leqslant 90$.



[4]

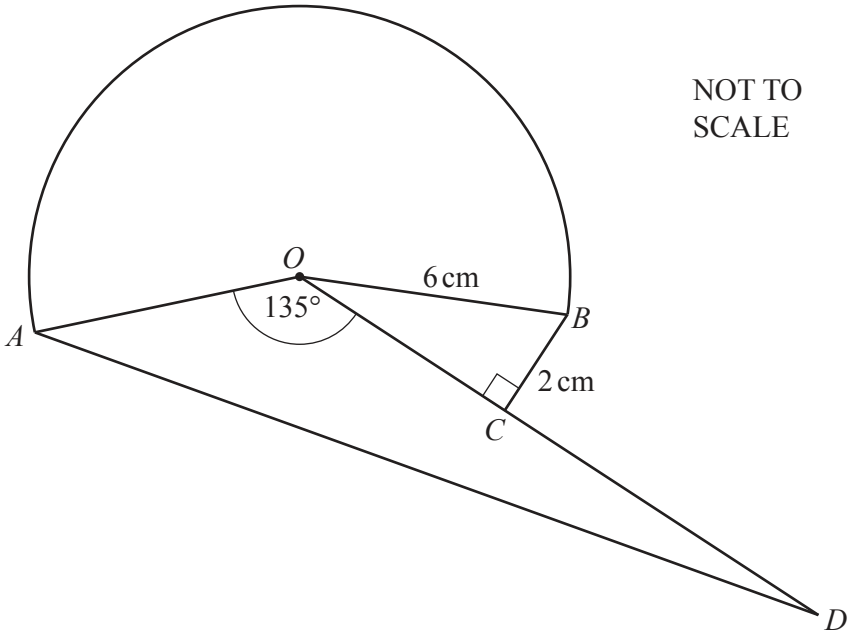
(c) Use your graph to solve the equation $3\cos 2x° = -2$ for $0 \leqslant x \leqslant 90$.

$x =$ ..... [1]

(d) By drawing a suitable straight line, solve the equation $120\cos 2x° = 80 - x$ for $0 \leqslant x \leqslant 90$.

$x =$ ..... [3]

8 (a)



The diagram shows a shape made from a major sector AOB and triangles OBC and AOD. $OB = 6\,\text{cm}$, $BC = 2\,\text{cm}$, obtuse angle $AOC = 135°$ and angle $BCO = 90°$.

(i) Show that angle $BOC = 19.5°$, correct to 1 decimal place.

[2]

(ii) Calculate the area of the major sector AOB.

..... cm^2 [3]

(iii) C is the midpoint of OD.

Calculate AD.

..... cm [5]

(iv) Calculate the total area of the shape.

..... cm^2 [4]

(b) A sector of a circle has radius 8 cm and area 160 cm^2.
A mathematically similar sector has radius 20 cm.

Calculate the area of the larger sector.

..... cm^2 [3]

9 A is the point (0, 2), B is the point (3, 3), and C is the point (4, 0).

(a) Determine if triangle ABC is scalene, isosceles, or equilateral.
You must show all your working.

[4]

(b) **(i)** Find the equation of the line AC.
Give your answer in the form $y = mx + b$.

$y =$ ..... [3]

(ii) Find the equation of the perpendicular bisector of AC.
Give your answer in the form $y = mx + b$.

$y =$ ..... [4]

(iii) $ABCD$ is a kite.
The point D has coordinates $(w, 4w + 1)$.

Find the coordinates of D.

(..... , ...) [3]

10 **(a)** Expand and simplify.

$$4(2x-1)-6(3-x)$$

..... [2]

(b) Factor completely.

(i) $6x^2y+9xy$

..... [2]

(ii) $4x^2-y^2+8x+4y$

..... [3]

(c) Antonio travels 100 km at an average speed of x km/h.
He then travels a further 150 km at an average speed of $(x + 10)$ km/h.
The time taken for the whole journey is 4 hours 20 minutes.

(i) Show that $13x^2 - 620x - 3000 = 0$.

[4]

(ii) Solve $13x^2 - 620x - 3000 = 0$ to find the speed Antonio travels for the first 100 km of the journey.
You must show all your working and give your answer correct to 1 decimal place.

..... km/h [3]

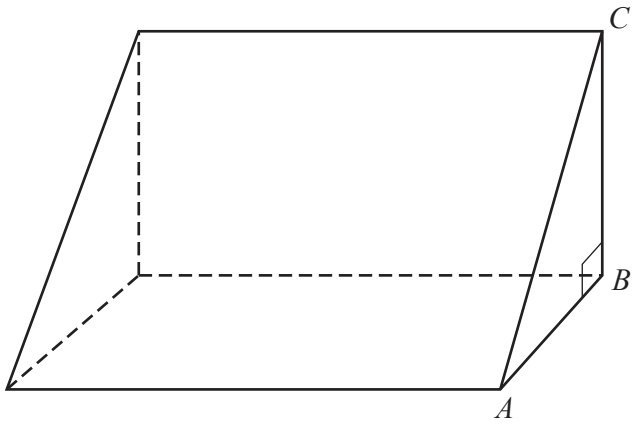
11 **(a)** Find the volume of a cone of radius 5 cm and height 11 cm.

..... cm^3 [2]

(b) Find the radius of a hemisphere of volume 136 cm^3.

..... cm [3]

(c)



NOT TO SCALE

The diagram shows a triangular prism.
$AB = 20$ millimeters, $BC = 14$ millimeters, and angle $ABC = 90°$.
The volume of the prism is 5.6 cubic centimeters.

(i) Show that the length of the prism is 40 millimeters.

[3]

(ii) Calculate the total surface area of the prism.

..... mm^2 [4]

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